(19) Europäisches Patentamt
European Patent Office
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(11) **EP 2 200 062 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.06.2010 Bulletin 2010/25

(51) Int Cl.:
H01H 39/00 *(2006.01)*

(21) Application number: **08021977.7**

(22) Date of filing: **18.12.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

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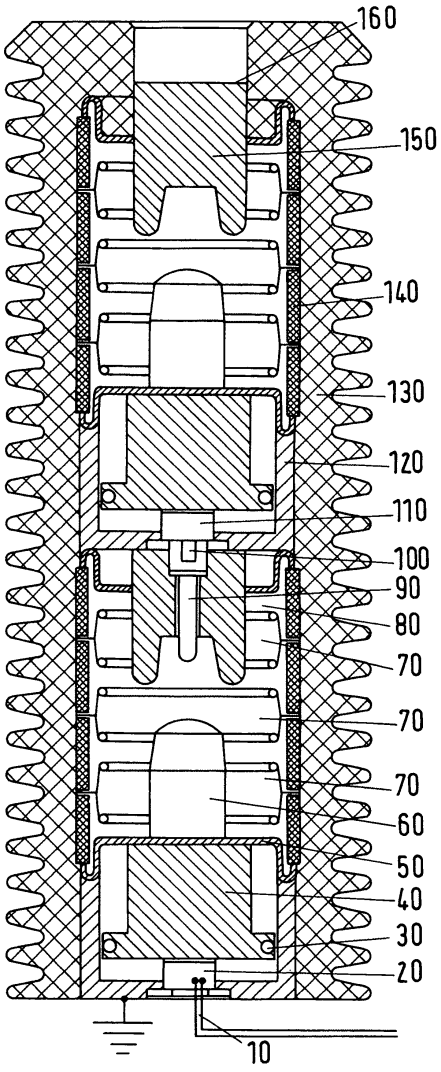
(54) **Short-circuit device for medium and high-voltage switching devices**

(57) The invention relates to a short-circuit device for medium and high-voltage switching devices, in which at least one moving contact is moved onto a fixed contact by means of a propelling charge, according to the pre-characterizing clause of patent claim 1. In order to ensure that a higher dielectric strength is produced, according to the invention it is proposed that the short-circuit device comprises two contacts connected in series, wherein a fixed and a moving contact are provided in each case, and that the first fixed contact contains a mechanical ignition device for the propelling charge of the second moving contact in such a way that when the first moving contact reaches the first fixed contact this mechanically ignites the propelling charge for the second moving contact at this point.

Fig.1



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Description

[0001] The invention relates to a short-circuit device for medium and high-voltage switching devices, in which at least one moving contact is moved onto a fixed contact by means of a propelling charge, according to the pre-characterizing clause of patent claim 1.

[0002] A short-circuit device has already been disclosed in DE 102 54 497 B3 in which a propelling charge is provided for moving the moving contact. An effective and mechanically very fast contact closure can be achieved in this way.

[0003] The invention is based on the object of further developing a short-circuit device of this kind to the effect that a higher dielectric strength is produced.

[0004] The object set is achieved according to the invention by the characterizing features of claim 1.

[0005] Further advantageous embodiments are specified in the dependent claims.

[0006] The heart of the invention is that the short-circuit device comprises two contact arrangements connected in series, wherein a fixed and a moving contact are provided in each case, and that the first fixed contact contains a mechanical ignition device for the propelling charge of the second moving contact in such a way that when the first moving contact reaches the first fixed contact this mechanically ignites the propelling charge for the second moving contact at this point. This mechanically forces a successive sequence of firing of the propelling charges. This is thereby achieved in a reliable manner.

[0007] A high dielectric strength is achieved by spreading the short-circuit device across two contacts in series.

[0008] In a further advantageous arrangement, it is specified that each moving contact is connected to a piston-cylinder unit in which one or more propelling charges are arranged. This provides a reliable operational implementation of the stated functional requirement.

[0009] In a further advantageous arrangement, it is specified that a gas-tight membrane, which is punctured by the piston at intended breakpoints when the propelling charge is ignited, is provided between piston and contact piece. This makes it possible to design the remaining part of the contact area in the form of a vacuum chamber.

[0010] In a further advantageous arrangement, it is specified that at least the chambers in which the switching path lies are vacuum chambers.

[0011] In a further advantageous arrangement, it is specified that in each case a plurality of metallic screen elements, which are each separated from one another by a gap, are provided around each moving contact along the switching path.

[0012] In a further advantageous arrangement, it is specified that the moving contacts are designed with a conical shape and that the respective fixed contacts are provided with an inner cone in a complimentary manner. This provides a large-area contact of the contact surfaces.

[0013] In a final advantageous embodiment, it is specified that the series-connected switches are arranged in a common insulation-encapsulated housing.

[0014] An exemplary embodiment of the invention is shown in the drawing.

[0015] The figure shows a sectional view of a short-circuit device according to the invention, designated here as a cascade short-circuit device. A moving contact 60 and a fixed contact are shown in the bottom part of the drawing. Both are arranged in a vacuum chamber 80.

[0016] The moving contact is driven by means of a propelling charge which, when it is ignited, closes the moving contact onto the fixed contact. For this purpose, the propelling charge 20 activates a piston 40 which penetrates the intended break line of a membrane 50 and moves the moving contact. Now when the first moving contact 60 reaches the fixed contact, then a mechanical firing pin 90 is actuated at this point. This firing pin then ignites the impact igniter of the second propelling charge 110. Following this, the second (top) moving contact subsequently moves toward the fixed opposing contact until it also closes at this point. In both cases, the current is transmitted by means of conductor lines or sliding contacts on the respective piston and the respective moving contact.

[0017] In this exemplary embodiment, the bottom pair of contacts is arranged in a separate vacuum chamber and the top pair of contacts in a further separate vacuum chamber.

[0018] However, it is also conceivable that all contact pairs be arranged in a common vacuum chamber and that this be divided into different sub-chambers separated by membranes.

[0019] A plurality of screens, each separated from one another by an air gap, is arranged in a line along both switching paths.

[0020] Overall, this results in a design of short-circuit device in which a high dielectric strength is achieved, because the voltage is divided between two switching sub-sections.

[0021] Overall, however, the arrangement is enclosed by a contiguous insulation body 130. As an alternative to this, the system can work without an insulation body when the environment is insulating gas.

List of references

[0022]

10	Electrical priming charge
20	Propelling charge
30	Current transition
40	Piston
50	Membrane with intended break point
60	Moving contact piece
70	Multiple screen
80	Vacuum chamber
90	Mechanical firing pin

100 Impact igniter
110 Propelling charge
120 Cylinder
130 Insulation

Claims

1. A short-circuit device for medium and high-voltage switching devices, in which at least one moving contact is moved onto a fixed contact by means of a propelling charge, wherein the short-circuit device comprises two contacts connected in series, wherein a fixed and a moving contact are provided in each case, and wherein the first fixed contact contains a mechanical ignition device for the propelling charge of the second moving contact in such a way that when the first moving contact reaches the first fixed contact this mechanically ignites the propelling charge for the second moving contact at this point.

2. The short-circuit device as claimed in claim 1, wherein each moving contact is connected to a piston-cylinder unit in which one or more propelling charges are arranged.

3. The short-circuit device as claimed in claim 1 or 2, wherein a gas-tight membrane, which is punctured by the piston at intended breakpoints when the propelling charge is ignited, is provided between piston and contact piece.

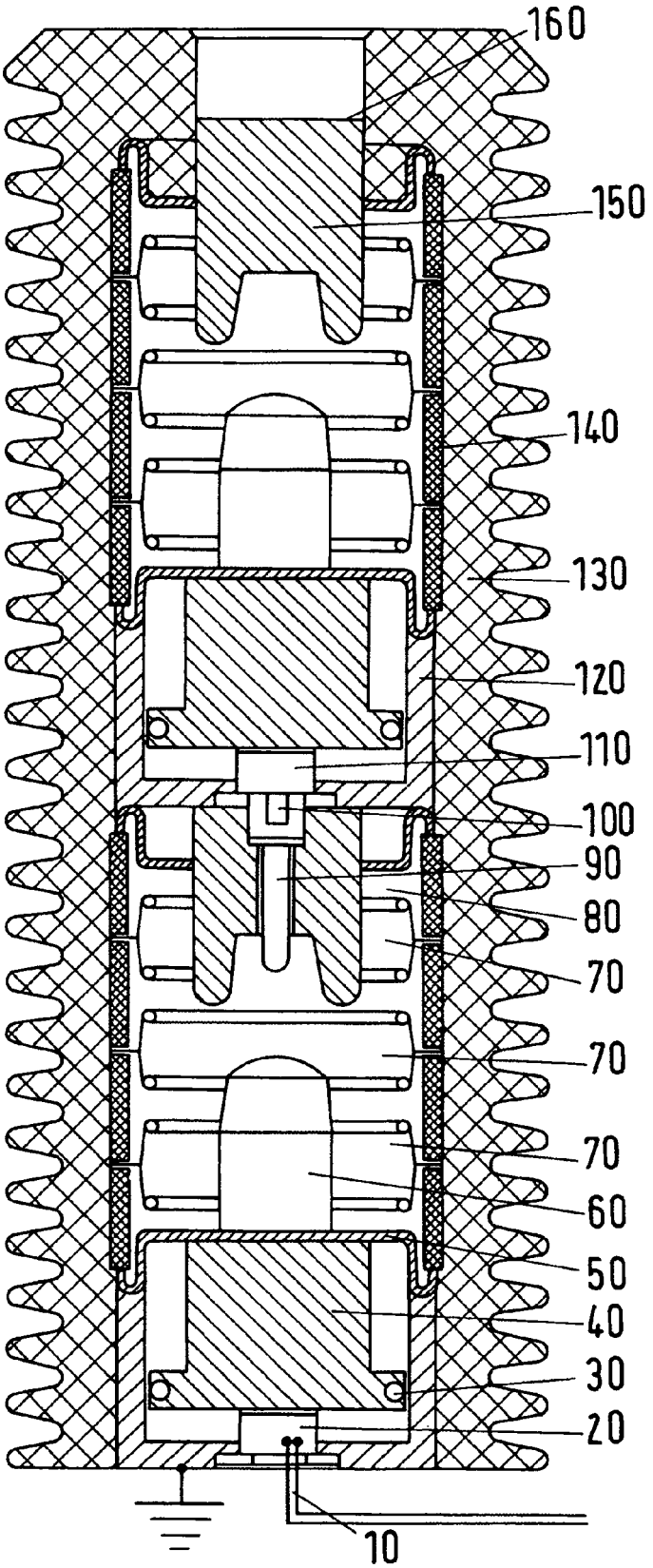
4. The short-circuit device as claimed in one of the preceding claims, wherein at least the chambers in which the switching path lies are vacuum chambers.

5. The short-circuit device as claimed in one of the preceding claims, wherein in each case a plurality of metallic screen elements, which are each separated from one another by a gap, are provided around each moving contact along the switching path.

6. The short-circuit device as claimed in one of the preceding claims, wherein the moving contacts are designed with a conical shape and the respective fixed contacts are provided with an inner cone in a complimentary manner.

7. The short-circuit device as claimed in one of the preceding claims, wherein the series-connected switches are arranged in a common insulation-encapsulated housing.

Fig.1



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EUROPEAN SEARCH REPORT

Application Number
EP 08 02 1977

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 94 19 141 U1 (KLOECKNER MOELLER GMBH [DE]) 28 March 1996 (1996-03-28) * page 3 - page 4; figure 1 *	1	INV. H01H39/00
A	US 4 224 491 A (KROON PETER J) 23 September 1980 (1980-09-23) * column 2, line 27 - column 7, line 7; figures 1-7 *	1	
A,D	DE 102 54 497 B3 (MOELLER GMBH [DE]) 3 June 2004 (2004-06-03) * paragraph [0043] - paragraph [0055]; figures 4,5 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			H01H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 May 2009	Nieto, José Miguel

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 02 1977

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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12-05-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 9419141 U1	28-03-1996	NONE	
US 4224491 A	23-09-1980	NONE	
DE 10254497 B3	03-06-2004	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 10254497 B3 **[0002]**